

We claim:

1. A slurry system for removal of metal from a substrate comprising:

(c) a first slurry which comprises abrasive and provides for partial removal of said metal from said substrate; and

5 (d) a second slurry which provides for further removal of said metal from said substrate,

wherein said first slurry has higher concentration of said abrasive than said second slurry.

10 2. The slurry system of claim 1 wherein said metal is selected from copper, tantalum, silicon dioxide, or mixtures thereof.

3. The slurry system of claim 1 wherein said metal is copper.

4. The slurry system of claim 1 wherein said second slurry is abrasive free.

5. The slurry system of claim 1 wherein said abrasive is selected from alumina, titania, zirconia, gennania, silica, ceria, or mixtures thereof.

15 6. The slurry system of claim 3 wherein said abrasive is silica.

7. The slurry system of claim 4 wherein said abrasive is precipitated silica.

8. The slurry system of claim 1 wherein said abrasive is present in an amount of from 0.1 to 30 percent by weight of said first slurry.

20 9. The slurry system of claim 4 wherein said silica has an aggregate of primary particles, said primary particles having an average diameter of at least seven (7) nanometers, wherein said aggregate has an aggregate size of less than one (1) micron, and a hydroxyl content of at least seven (7) hydroxyl groups per nanometer squared.

25 10. The slurry system of claim 1 wherein at least one of said first and second slurries further comprise an oxidant.

11. The slurry system of claim 8 wherein said oxidant is selected from inorganic and organic per-compounds, bromic acid, chloric acid, nitrates, sulfates, or mixtures thereof.

30 12. The slurry system of claim 8 wherein said oxidant is selected from hydrogen peroxide, urea-hydrogen peroxide, or mixtures thereof.

13. The slurry system of claim 1 wherein at least one of said first and second slurries further comprise a material selected from complexing agent,

anticorrosion agent, stopping compound, polyvalent cation sequestrant, thickener, or mixtures thereof.

14. The slurry system of claim 1 wherein at least one of said first and second slurries further comprises an acid selected from picolinic acid, dipicolinic acid, qunolinic acid, and mixtures thereof.

15. The slurry system of claim 1 wherein at least one of said first and second slurries further comprises a polyvalent cation sequestrant and a anticorrosion agent.

16. The slurry system of claim 1 wherein at least one of said first and second slurries further comprises a polyvalent cation sequestrant, a anticorrosion agent, and a thickener.

17. The slurry system of claim 1 wherein said first slurry leaves residual metal on said substrate.

18. The slurry system of claim 3 wherein said first slurry leaves residual copper on said substrate.

19. The slurry system of claim 17 wherein said second slurry at least partially removes said residual copper from said substrate.

20. The slurry system of claim 18 wherein said second slurry at least partially removes said residual copper from said substrate.

21. A method for removal of copper comprising:  
(a) applying to a substrate a first slurry which comprises an abrasive;  
(b) applying to said substrate a second slurry,  
wherein said first slurry has higher concentration of said abrasive than said second slurry.

22. The method of claim 21 wherein said first slurry removes a portion of said copper from said substrate, and leaves residual copper on said substrate.

23. The method of claim 21 wherein said second slurry at least partially removes said residual copper from said substrate.

24. A method for polishing a microelectronic substrate comprising:  
(a) performing a first polish with a first slurry and polishing pad, wherein said first slurry comprises abrasive; and

(b) performing a second polish with a second slurry and polishing pad wherein said first slurry has higher concentration of said abrasive than said second slurry.

5           25.   The method of claim 24 wherein said first polish provides for partial removal of metal from said substrate and leaves residual portions of said metal on said substrate.

26.   The method of claim 25 wherein said second polish provides for at least partial removal of said residual portions of said metal from said substrate.

10          27.   The method of claim 25 wherein said metal is selected from copper, tantalum and silicon dioxide.

28.   The method of claim 24 wherein said first polish is completed prior to applying said second slurry.

29.   The method of claim 24 further comprising the step of washing said substrate after completion of said first polish and prior to initiation of said second polish.

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